

# Are Fatigued Users Fleeing Social Media? A Three-Level Meta-Analysis on the Association Between Social Media Fatigue and Social Media Use

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As users' psychological involvement with social media enters a bottleneck, social media fatigue (SMF) is silently growing. Numerous studies investigating the relationship between social media use and SMF have shown disparate results, leading to substantial uncertainty of SMF in relation to different types of social media use. To clarify this controversy, this study used the three-level meta-analytic method to quantitatively synthesize 121 studies with 213 effect sizes ( $N = 55,896$ ). No significant publication bias was detected. Results showed that SMF was highly positively related to both discontinuous use ( $r = .46$ ) and problematic use ( $r = .43$ ), but negligibly related to general use ( $r = .09$ ). Moderator analyses indicated that the age of the sample, assessment mode, and type of social media moderated the relationship between SMF and social media use. These findings suggest a widespread "SMF paradox" among social media users, in which they have a negative attitude toward social media but still rely heavily on it and do not significantly reduce the intensity of their use. Instead, they may tend to engage in passive use. We attempted to explain this phenomenon from the three-dimensional perspective of social media use.

## Public Policy Relevance Statement

The question of whether fatigued users truly flee social media has been a topic of controversy in previous studies. To address this issue, this meta-analysis examined the association between social media fatigue (SMF) and social media use based on data from over 55,000 participants in 121 longitudinal studies. The findings suggest the existence of an SMF paradox; that is, although fatigued users have negative attitudes toward social media, they also exhibit high psychological dependence, which leads them to maintain their social media use rather than reducing or abandoning it. Instead, they may tend to engage in passive use.

**Keywords:** social media, discontinuous use, general use, problematic use, social media fatigue

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With the increasing popularity of the Internet and mobile devices, social media has become a "necessity" in both work and daily life. Over the past decade, the number of social media users worldwide has exponentially increased from 172 million to 4.76 billion

(Kemp, 2023). However, behind the skyrocketing numbers lies a gradual decline in its appeal, with many users experiencing negative online interactions that lead to a bottleneck of psychological involvement (Bright et al., 2015). A global survey revealed that 31% of Facebook users became bored with social media, and 24% of respondents reported using their favorite social media platform less frequently than when they first signed up (Goasduff & Pettey, 2011). The COVID-19 pandemic has exacerbated this trend, with social media flooded with false news and rumors. Additionally, many people have turned to online teleclasses and offices, which have further contributed to social media fatigue (SMF; Ngien & Jiang, 2022).

In the context of the gradual spread of SMF, a growing body of empirical literature has investigated the antecedents and consequences of SMF (e.g., Bright et al., 2015; Dhir et al., 2019; Sunil et al., 2022). Among these studies, the relationship between SMF and social media use has been a focal point of researchers' attention, but the conclusions have been inconsistent and even contradictory. On the one hand, some studies have found a positive correlation between SMF and discontinuous use intention or behavior toward social media (e.g., Fu et al., 2020; Maier, Laumer, Eckhardt, & Weitzel, 2015), while others have shown a nonsignificant correlation

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(e.g., Adhikari & Panda, 2020). On the other hand, several empirical studies have supported the positive association between SMF and social media addiction (e.g., Lian et al., 2018). These seemingly contradictory results suggest that individuals with SMF may have a psychological-behavioral paradox, in which they continue to use social media at high intensity despite their negative attitude toward it. Therefore, to clarify the controversy and draw more accurate conclusions from a larger sample, we aim to examine the direction and magnitude of the relationships between SMF and different types of social media use, as well as potential moderators, using a meta-analytic approach.

## Conceptualization of Social Media Use and SMF

Social media is an online platform with three core features: allowing users to create their profiles, communicate with others, and view and traverse their own and other members' connection lists (Ellison & Vitak, 2015). According to the studies we have retrieved, social media use can be broadly classified into three types based on the propensity of use: problematic use, general use, and discontinuous use. Problematic use is commonly conceptualized as the uncontrollable, prolonged use of social media and the resulting physical discomfort and psychosocial maladjustment (Mok et al., 2014). General use, also known as "social media use" in academia, refers to a variety of activities conducted through social media and is often measured by researchers in terms of frequency, duration, intensity, habituation, and other indicators (Valkenburg, 2021; Y. Zhang, Li, Yu, 2021). However, discontinuous use measures the propensity of social media use in reverse, describing users' intentions and behaviors to reduce and abandon social media (X. Li et al., 2018), such as diving, avoiding, and taking a break (L. Liu et al., 2017).

SMF is an emerging issue in which the fervor for social media has begun to fade (Technopedia, 2011). Academia typically defines SMF through three orientations: psychological, behavioral, and mixed (Dai et al., 2019). Scholars with a psychological orientation view SMF as a state of mental exhaustion suffered by users after experiencing technological, informational, and communication overload when using social media (Dhir et al., 2018). Behaviorally oriented researchers define SMF from a discontinuous use perspective, describing it as the behavior of users reducing or avoiding their social media use (Cramer et al., 2016). Researchers holding a mixed orientation integratively emphasize that SMF belongs to both an emotion of exhaustion and manifests itself in discontinuous behaviors (C. C. Lee et al., 2014). However, most researchers support that SMF is more of a psychological fatigue (e.g., Ravindran et al., 2014; S. Zhang et al., 2016), and the behavioral and mixed orientation definitions may confuse the relationship between SMF and social media use. According to H. Zheng and Ling (2021), we define SMF as "a set of negative emotional responses to activities on social media platforms, such as tiredness, burnout, exhaustion, frustration, disinterest toward communication."

## The Association Between SMF and Social Media Use

### Discontinuous Use

The coping model of user adaptation suggests that users typically employ strategies to minimize possible adverse outcomes when threatened by technology stress (Beaudry & Pinsonneault, 2005). As mentioned above, SMF is a state of emotional exhaustion induced by

technological stress (Dhir et al., 2018). For individuals experiencing a technological threat such as SMF, opting out of exhaustion-producing situations is one of their common strategies to reduce fatigue (Maier, Laumer, Weinert, & Weitzel, 2015). Furthermore, SMF is usually accompanied by low satisfaction with social media (K. M. Lin, 2016). The "uses-and-gratifications" theory emphasizes satisfaction as a direct driver for users to maintain their use of social media (Suler, 1999). Even though a few studies did not yield significant results (Adhikari & Panda, 2020), most have shown a positive correlation between SMF and discontinuous use (Dai et al., 2019), avoidance (Dai et al., 2020), break, and switch (Shokouhyar et al., 2018). Although existing studies were roughly consistent in the direction of the association between the two, there is a wide gap in the magnitude distributed from  $-0.05$  (J. Wang, 2021) to  $0.82$  (X. Zhang et al., 2020). Therefore, this study intends to examine the magnitude of the correlation between SMF and discontinuous social media use by meta-analysis.

### General Use

As mentioned above, SMF is an essential trigger for discontinuous use intention, and according to the technology acceptance model, use intention is the direct cause of behavior (Venkatesh & Davis, 2000). There is also evidence that SMF was associated with decreased use duration and frequency (e.g., Fu et al., 2021; K. M. Lin, 2016). In contrast, some empirical research has not found that SMF reduced the duration of social media use (e.g., Tugtekin et al., 2020), and in fact, it may even increased the usage (e.g., Cramer et al., 2016). Furthermore, researchers who detected a positive association believe that it is those users who use social media habitually and automatically that are accompanied by fatigue (e.g., Soror et al., 2022). Consequently, the direction of the association between SMF and general social media use remains pending and needs to be further clarified by meta-analysis.

### Problematic Use

Based on the stressor-strain-outcome (SSO) model, previous literature has identified information and social overload as technological stressors that lead to SMF (Maier, Laumer, Eckhardt, & Weitzel, 2015; S. Zhang et al., 2016). Additionally, Yu et al. (2018) proposed an extended SSO model, which emphasizes that problematic social media use is both a stressor and an antecedent for technological stressors. Maier, Laumer, Weinert, and Weitzel (2015) also noted that excessive social media use is a prerequisite for the emergence of cognitive overload. In other words, individuals only experience cognitive overload and more SMF when they are addicted to social media (H. Zheng & Ling, 2021). Although several empirical studies have confirmed a significant positive association between problematic use and SMF, the effect sizes have been heterogeneous across studies, ranging from  $0.06$  (Harren et al., 2021) to  $0.70$  (J. H. Kim et al., 2022). Therefore, further clarification through meta-analysis is necessary.

Collectively, previous studies consistently indicate a positive association between SMF and discontinuous and problematic use, but the magnitude of this relationship remains unclear. In contrast, the association between SMF and general use is more varied in direction. Most previous studies have examined this association using the SSO model, which treats SMF as a "strain" and problematic use as an

antecedent that induces technological “stress.” Discontinuous use is typically identified as an “outcome” variable resulting from SMF. General use, on the other hand, has been inconsistently positioned as an antecedent, outcome, or control variable. However, all existing studies on the “SMF-social media use” association have been cross-sectional, meaning that data for all variables were collected simultaneously and the position of social media use and SMF in the theoretical model is only a statistical analysis rather than a chronological distinction. This suggests that users who suffer from SMF may experience both discontinuous use intention and behavior as well as problematic use patterns, creating a “SMF paradox.”

## Potential Moderators

### Gender

Gender may moderate the relationship between SMF and social media use. First, males and females differ in their media preferences. Men tend to prefer video games, violence, and pornography (Dufour et al., 2016), while women are more attracted to social network sites and instant messaging applications (Coyne et al., 2020; Greenwood & Winn, 2020). This preference for social media may lead girls to experience more social overload and, consequently, more SMF (Maier, Laumer, Eckhardt, & Weitzel, 2015; Maier, Laumer, Weinert, & Weitzel, 2015; Yan et al., 2023). As a result, girls may be more likely to adopt negative coping styles, such as discontinuous social media use, in response to SMF. Therefore, the relationship between social media use and SMF may be stronger among girls.

### Age

The age of the sample may also play a moderating role. According to Erikson's (1993) theory of psychosocial development, adolescents and college-aged adults face the developmental tasks of constructing self-identity and seeking intimate relationships. Digital media serve as a critical developmental context for youth, allowing them to explore self-identity and establish social relationships (Ehrenreich et al., 2021). In the United States, data indicate that 85% of adolescents and 90% of emerging adults use at least one social media platform, making social media a “youth-driven phenomenon” (C. C. Yang et al., 2021). Therefore, adolescents and emerging adults may be more susceptible to social media than other age groups. Some studies have also found that SMF is higher in young adults compared to older samples (Dai et al., 2019; Soror et al., 2022). Taken together, SMF and social media use may be more strongly correlated among youth.

### Culture

Cultural differences may contribute to the heterogeneity of results. Cultural theory suggests that people in Eastern cultures, characterized by collectivism, tend to communicate using nonverbal signals, while Western cultures, marked by individualism, prefer using verbal messages (Kayan et al., 2006). This implies that collectivistic countries may be more likely to use social media for communication. Additionally, compared to individualistic cultures that value independence and autonomy, collectivist cultures emphasize the interdependence of individuals, where social activities account for a larger proportion of daily life (Grossmann & Na, 2014). Consequently, the collectivist culture may increase the need for users to use social

media to maintain offline relationships, which is a crucial factor leading to social overload (Maier, Laumer, Eckhardt, & Weitzel, 2015) and subsequent SMF. In summary, it is conceivable that SMF and social media use may be more strongly associated in collectivist countries.

## Type of Social Media

The type of social media may moderate the relationship between SMF and social media use. Different social media platforms represent the unique social background of their users, and their media effects may also vary (Marwick & Boyd, 2011; Valkenburg et al., 2016). On the one hand, the media richness theory suggests that different media present varying levels of information richness and, therefore, differ in their impact on users' well-being (Daft & Lengel, 1986; D. Liu et al., 2019). Image-centric social media platforms (e.g., Instagram) provide more colorful and intuitive information than text-based social media platforms (e.g., Facebook), which may cause users to experience more information overload and lead to SMF. An empirical study of French users showed that problematic Instagram use was positively correlated with SMF, but problematic Facebook use was not (Harren et al., 2021). On the other hand, according to social relationship theory (Granovetter, 1973), the openness and types of relationships between social media users vary depending on the purpose of use. Strong-ties social media platforms, such as Facebook, WeChat, and WhatsApp, are more private and mainly used to maintain social ties with offline friends and acquaintances. Conversely, weak-ties social media platforms, such as Twitter, Instagram, and Weibo, are more public, with users connecting over news or interests and being less socially connected (Waterloo et al., 2018). Collectively, from the perspective of information processing, SMF is more likely to be experienced in weak-ties social media platforms. From the perspective of relationship maintenance, however, SMF is higher when using strong-ties social media platforms.

## Measures of Use

Measures of discontinuous use may account for differences in effect sizes. For example, some studies assessed users' discontinuous intentions, such as “In the future, I will use Qzone far less than today” (S. Zhang et al., 2016), while others measured discontinuous behaviors, such as “I have discontinued my use of Facebook” (Maier, Laumer, Weinert, & Weitzel, 2015). The technology acceptance model (Williams et al., 2009) distinguishes between intention and behavior as two related but distinct constructs. In other words, individuals who have a continuous or discontinuous intention to use social media may not necessarily act on it. Therefore, the strength of SMF in relation to discontinuous intention may be more potent than discontinuous behavior.

In general use, frequency and duration are objective indicators, while intensity and habituation are subjective indicators (Ellison et al., 2007; Valkenburg, 2021). The latter may be more closely related to SMF, which is also a subjective phenomenon. A similar meta-analysis also found that fear of missing out is more strongly associated with use intensity than with duration and frequency (Y. Zhang, Li, & Yu, 2021). On the other hand, excessive and addictive use are both included in the analysis of problematic use. Excessive use refers to using social media more frequently and for longer periods than is normal for the individual, but does not necessarily lead to addiction. In

contrast, addictive use is characterized by features such as tolerance and withdrawal symptoms, which have a more serious impact on social functioning (Kuss & Lopez-Fernandez, 2016). This suggests that the link between addictive use and SMF may be stronger.

### Study Characteristics

To ensure the robustness of the meta-analysis results, we included four study characteristic moderators in addition to the potential moderators mentioned above. These moderators were the publication year, written language, publication status, assessment mode, and methodological quality. By including these moderators, we can further test the severity of selective reporting bias.

### The Present Study

To our knowledge, there have been two systematic reviews (Sunil et al., 2022; H. Zheng & Ling, 2021) and one meta-analysis (Ou et al., 2023) that have involved the relationship between SMF and social media use. Ou et al.'s study utilized meta-analytic structural equation modeling to investigate the drivers and major consequence of SMF, and we would like to highlight the differences between their study and ours. Firstly, Ou et al. only included studies on addictive and discontinuous use, but not on general use. Secondly, they only searched English databases, which may limit the generalizability of their results and prevent the examination of cultural moderation effects. Thirdly, due to the second point and the early search time (August 2021), they included very few effect sizes, with only 11 effect sizes for addictive use (compared to our 31) and 17 effect sizes for discontinuous use (compared to our 152). Finally, their definition of SMF was not limited to the concept of psychological fatigue, which may exaggerate the relationship between SMF and social media use (especially discontinuous use).

In summary, to overcome the limitations of previous research and provide a comprehensive picture of the relation between SMF and social media use, this study employs an advanced method, the three-level meta-analytic model, to quantitatively integrate relevant studies. Our study aims to address the following research questions:

**Research Question 1:** What is the overall association between SMF and three types of social media use (i.e., discontinuous use, general use, and problematic use)?

**Research Question 2:** Does the phenomenon of the “SMF paradox” truly exist?

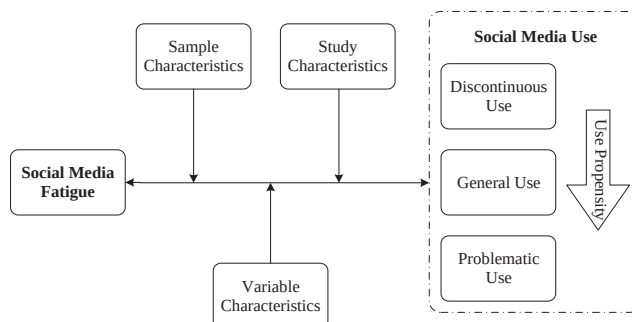
**Research Question 3:** Can sample characteristics (gender, culture, age, and type of social media), variable characteristics (measures of social media use), and study characteristics (publication year, publication status, written language, assessment mode, and methodological quality) explain the between-study heterogeneity?

The framework of our study is illustrated in Figure 1.

### Method

This study was conducted following the international meta-analysis guidance—PRISMA 2020 (Page et al., 2021). To enhance transparency and standardization, the protocol was also preregistered

**Figure 1**  
*The Framework of the Present Study*



on the International Prospective Register for Systematic Reviews with the registration CRD42022318761.

### Search of Studies

Literature was retrieved from three English databases (Web of Science, ProQuest, and PubMed), two Chinese databases (China National Knowledge Infrastructure and Wanfang Data), and four pre-print platforms (ChinaXiv, PsyArXiv, Open Science Framework [OSF] Preprints, and Preprints.org) for studies published prior to June 2023. The search string consisted of two elements: (a) social media (*social media OR social network\* site\* OR social network\* platform\**) or specific platforms (*Facebook OR Instagram OR Twitter OR Snapchat OR MySpace OR WhatsApp OR YouTube OR Tumblr OR Pinterest OR Vine OR Reddit OR web 2.0 OR WeChat OR QQ OR Weibo*) and (b) fatigue (*fatigue OR exhaustion OR burnout OR technostress*). The starred search terms allowed us to find variations of the respective keyword. For instance, by using “*social network\* site\**,” we identified the terms social networking site, social network sites, and so forth. To maximize the identification of relevant literature, we additionally examined the reference lists of pertinent systematic reviews (Dai et al., 2019; Sunil et al., 2022; H. Zheng & Ling, 2021).

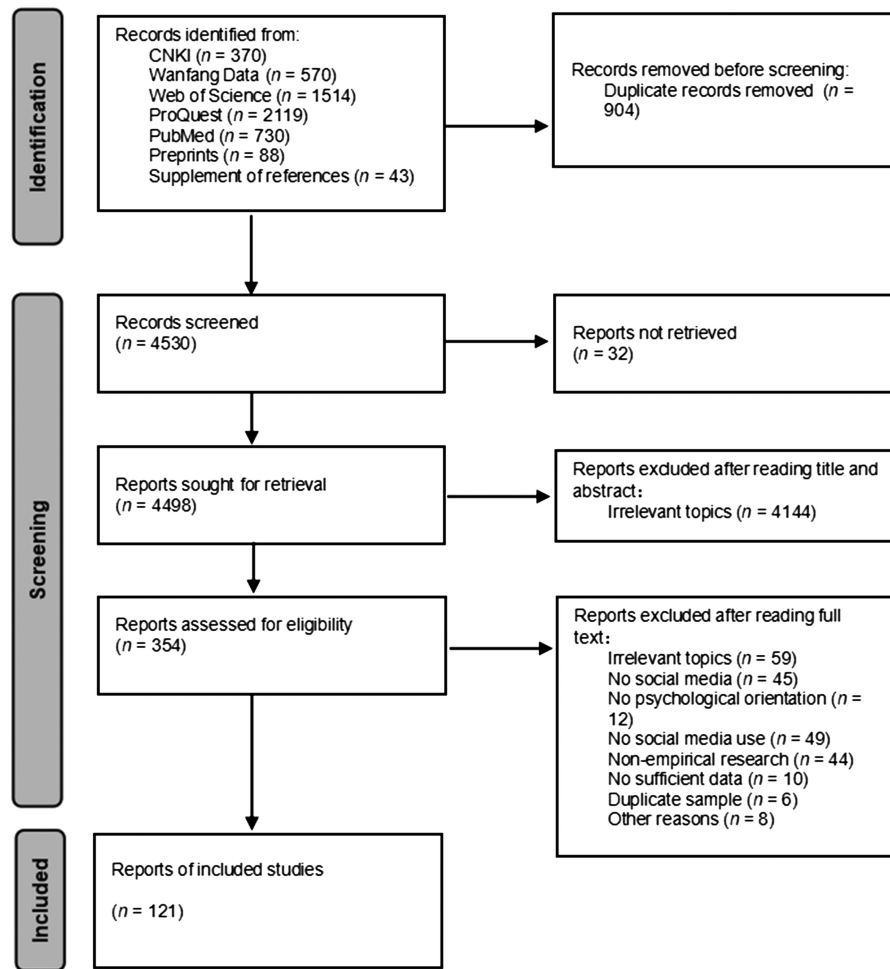
### Inclusion Criteria

Primary studies meeting the following criteria were considered eligible for inclusion in the present meta-analysis: (a) The study must be empirical or quantitative. (b) The study must investigate the relationship between SMF and any type of social media use (discontinuous use, general use, and problematic use). (c) The article must report Pearson’s correlation coefficient ( $r$ ) or other statistics that can be transformed to  $r$ . (d) The “fatigue” examined in the study must be social media-based and exclude other media (e.g., news fatigue, Zoom fatigue). (e) The SMF measured by the study must be psychological in orientation, excluding behavioral and mixed orientations. (f) The article must be written in English or Chinese. (g) The study must be accessible and downloadable. Figure 2 depicts the PRISMA flow chart of this study.

### Coding of Studies

Prior to coding, a coding book was prepared by referencing previous studies and recommendations from meta-analysis experts. The coding was then independently performed by two psychology graduate

**Figure 2**  
*PRISMA Flow Diagram of Included Studies*



Note. CNKI = China National Knowledge Infrastructure.

students, and interrater reliability was calculated. For continuous moderators (e.g., effect sizes), the intraclass correlation coefficient (ICC) was employed, while for categorical moderators (e.g., publication status), Cohen's  $\kappa$  was used. In cases of coding inconsistencies, an agreement was reached through negotiation or by rereading the primary article.

### Effect Size

The effect sizes were coded by using Pearson's correlation coefficient (ICC = .94). For studies that only presented statistics such as  $t$ ,  $F$ , and  $d$ , a web app was utilized for transformation (Lenhard & Lenhard, 2016). Notably, for discontinuous use, we reversed the direction of the correlation coefficients of studies reporting continuous use or other similar constructs. The ICC for the effect size was .94.

### Sample Characteristics

Gender was coded as the proportion of male participants in the sample (ICC = .84). Age was recorded as the mean age of the sample (ICC = 1.00). In addition, the country of each sample was coded, and the corresponding individualism index (ICC = 1.00) was extracted

based on Hofstede's (2001) theory of national cultural dimensions, with data obtained from <https://www.hofstede-insights.com/country-comparison/>. As for the type of social media ( $\kappa = .92$ ), we coded them based on their relationship attributes into three categories: strong-ties social media (e.g., Facebook, WeChat, WhatsApp), weak-ties social media (e.g., Instagram, Weibo, TikTok), and general social media (i.e., no specific platform was reported).

### Variables Characteristics

For measures of discontinuous use, we identified three categories: intention, behavior, and mixed ( $\kappa = .90$ ). For general use, we coded them into two categories: subjective indicators (i.e., frequency and duration) and objective indicators (i.e., use intensity and habitual use;  $\kappa = .97$ ). For problematic use, we created a variable with two subcategories: excessive use and addictive use ( $\kappa = .98$ ).

### Study Characteristics

The publication year was recorded as the year in which the article was officially published, while unpublished dissertations were coded

based on the year in which the applicant applied for the degree ( $ICC = 1.00$ ). We classified the publication status into two categories: published articles and unpublished dissertations ( $\kappa = 1.00$ ). For assessment mode, we treated it as a three-category variable that included paper-pencil, online, and mixed modes ( $\kappa = .95$ ). Additionally, we categorized the written language into Chinese and English articles ( $\kappa = 1.00$ ). To assess methodological quality, we developed an scale by referring to quality assessment tools developed by the National Institutes of Health (2014) and Y. Zhang, Li, and Yu (2021). A total of four indicators were included.<sup>1</sup> The score for each study on the above indicators was calculated, and the total score ranged from 0 to 8, with a higher score indicating better methodological quality ( $ICC = .83$ ).

## Publication Bias

Publication bias occurs when published studies are not representative of the overall study population, which can threaten the validity of meta-analytic results, conclusions, and practical guidance (Rothstein et al., 2005). On the one hand, unpublished dissertations are included, which allows for a direct test of the moderating effect of publication status. On the other hand, we also tested for the small-study effect, a type of publication bias, using both Begg's rank correlation test and Egger's regression test. The Begg's rank correlation test measures the severity of publication bias by examining the correlation (Kendall's  $\tau$ ) between the standardized effect size and the sampling variance (Begg & Mazumdar, 1994). If Kendall's  $\tau$  is not significant, it suggests that publication bias is not severe. Egger's regression test, on the other hand, tests the symmetry of the funnel plot. If the intercept of the regression equation is significantly different from zero, it indicates the presence of publication bias (Borenstein et al., 2009).

## Meta-Analytic Procedure

The effect size used in this study was the correlation coefficient ( $r$ ). First, we transformed the  $r$  to Fisher's  $Z$ , and then back-transformed the weighted mean effect size to  $r$  for interpretation. We followed Gignac and Szodorai's (2016) guidelines to interpret the magnitude of the effect size ( $r \approx .10$  as relatively small,  $r \approx .20$  as typical, and  $> .30$  as relatively large).

Additionally, conventional meta-analytic methods assume that effect sizes should be independent of each other, while many empirical studies report multiple effect sizes (e.g., a correlation coefficient is reported for multiple dimensions). To address this limitation, we employed the three-level meta-analytic model to examine the association between SMF and social media use. The three-level meta-analytic model decomposes the sources of variance into sampling variance (Level 1), within-study variance (Level 2), and between-study variance (Level 3) (Cheung, 2014). This method allows for the extraction of all effect sizes from each primary study, maximizing information retention and improving statistical power, and yielding a more accurate estimation (Cheung, 2014). We used the *metaSEM* package in R  $\times$  64 4.2.1-win to conduct the three-level meta-analysis, following a step-by-step tutorial by Cheung (2019). This package allows for the use of structural equation modeling to conduct three-level meta-analyses and handling missing covariates with full-information maximum likelihood estimation (Cheung, 2014).

The sampling variance (Level 1) for each effect size was estimated using the formula proposed by Borenstein et al. (2009). When the test for heterogeneity was significant, and the sum of within-study variance ( $I_2^2$ ) and between-study variance ( $I_3^2$ ) accounted for more than 75% of the total variance, further tests for moderating effects were carried out.

## Results

### Description of Studies

A total of 121 studies published between 2015 and 2023 (Median = 2,020) were included in the meta-analysis. The total sample size was 55,896 participants ( $M = 447.17$ ,  $SD = 278.78$ ). Study information for discontinuous use, general use, and problematic use are presented in Tables S1–S3 in the online supplemental materials, respectively. Effect sizes information and data book are available on OSF (B. Chen, 2023).

The analysis of discontinuous use was based on 152 effect sizes from 96 studies, with a total sample size of 38,309 individuals ( $M = 459.04$ ,  $SD = 174.20$ , range = 82–1,285) and a mean male ratio of 46.18%. Only seven studies reported the mean age of the sample ( $M = 25.94$ ,  $SD = 6.97$ , range = 18.74–37.04). Seventy studies were published, while 26 studies were unpublished. Fifty studies were in Chinese, and 46 studies were in English. The vast majority of the studies were conducted in China (71 studies, accounting for 73.96%).

The analysis of general use was based on 30 effect sizes from 27 independent samples of 26 studies, with a total sample size of 12,394 individuals ( $M = 423.51$ ,  $SD = 382.79$ , range = 192–2,012) and a mean male ratio of 47.24%. Eight studies reported the mean age of the sample ( $M = 27.19$ ,  $SD = 5.35$ , range = 20.30–37.04). Twenty studies have been published, while six studies remain unpublished. Seventeen studies were in English, and nine studies were in Chinese. Thirteen studies were conducted in China, three in United States, two each in India and Korea, and one each in Finland, Germany, Ireland, Kuwait, Taiwan, and Turkey.

The analysis of problematic use was based on 30 effect sizes from 23 independent samples of 20 studies, with a total sample size of 12,823 individuals ( $M = 557.52$ ,  $SD = 354.95$ , range = 209–1,554) and a mean male ratio of 44.04%. Eleven studies reported the mean age of the sample ( $M = 22.45$ ,  $SD = 5.94$ , range = 14.63–37.04). All studies have been published in English-language journals. Eight studies were from China, two from India, and one each from France, Korea, Pakistan, Saudi Arabia, South Africa, Spain, Taiwan, United Kingdom, and the United States. One study was conducted in multiple countries.

<sup>1</sup> The following criteria were used to assess the methodological quality of the studies: (1) Sampling method, with 2 points awarded for random sampling, 1 point for non-random sampling, and 0 points for not reporting. (2) Efficiency of the recovered questionnaires, with 2 points awarded for a score of 0.9 or above, 1 point for a score between 0.8 and 0.9, and 0 points for a score below 0.8 or unreported. (3) Internal reliability of the measures, with 2 points awarded for a score of 0.8 or above, 1 point for a score between 0.7 and 0.8, and 0 points for a score of 0.7 or below. (4) Publication level, with 2 points awarded for CSSCI (i.e., Chinese Social Sciences Citation Index) and JCR Q1–Q3 journals, 1 point for CSSCI extended edition, JCR Q4, and doctoral dissertations, and 0 points for other journals and master dissertations.

## Publication Bias Test

We tested for publication bias using the moderator test for publication status, Begg's rank correlation test, and Egger's regression test. The studies included in the analysis of problematic use were all published, so it was not possible to perform the moderator test for publication status. As shown in Table 1, there is no consistent evidence of significant publication bias in the three analyses.

## Effect Size Analyses

We used the random effect model to separately examine the associations between SMF and three types of social media use. In Table 2, it is evident that there is a significant and relatively large positive correlation ( $r = .456$ , 95% confidence interval [CI .417, .492]) between SMF and discontinuous use. However, the association between SMF and general use was negligible ( $r = .088$ , 95% CI [−.019, .193]). Moreover, a relatively large effect was found for the positive association ( $r = .434$ , 95% CI [.357, .505]) between SMF and problematic use. Tests for heterogeneity showed significant differences between effect sizes, and the variance share exceeded 75% for both Level 2 and Level 3. This suggests the need for further moderator analyses.

## Moderator Analyses

In terms of discontinuous use (see Table 3), only age is negatively related to the correlation between SMF and discontinuous use, although only marginally significant ( $B = -.139$ ,  $p = .076$ ). This suggests that the relationship between SMF and discontinuous use is more significant in younger samples. It should be noted that the moderator test of age is based on only eight effect sizes, so the results should be treated with caution.

In general use (see Table 4), age is also significantly negatively correlated with the effect size ( $B = -.176$ ,  $p = .021$ ), indicating that the link between SMF and general use is stronger in younger samples. The moderator test of assessment mode ( $B = -.415$ ,  $p = .041$ ) shows that the effect size under online assessment is significantly smaller than that under paper-pencil assessment. It should be reminded that although the moderating effect of social media type did not reach statistical significance, the effect size showed a small negative correlation ( $r = -.160$ ) in strong-ties social media, but a small positive correlation in weak-ties ( $r = .109$ ) and general social media ( $r = .131$ ).

For problematic use (see Table 5), again, only age is marginally significantly negatively correlated with the effect size ( $B = -.094$ ,  $p = .081$ ), indicating that the younger the age, the stronger the link between problematic use and SMF.

**Table 1**

*Tests of Publication Bias in Three Types of Social Media Use in Relation to SMF*

| Social media use  | Moderator test of publication status |          | Regression test |          | Rank correlation test |          |
|-------------------|--------------------------------------|----------|-----------------|----------|-----------------------|----------|
|                   | <i>B</i>                             | <i>p</i> | Intercept       | <i>p</i> | $\tau$                | <i>p</i> |
| Discontinuous use | .130                                 | .013     | 2.564           | .164     | .061                  | .263     |
| General use       | −.060                                | .641     | −6.416          | .134     | −.103                 | .422     |
| Problematic use   | —                                    | —        | −3.691          | .287     | −.084                 | .507     |

## Discussion

Amidst the declining psychological engagement with social media, the present meta-analysis seeks to comprehensively synthesize the available data on the relationship between SMF and social media use. We collected 121 studies in both Chinese and English, involving over 55,000 participants. The findings indicate a positive correlation between SMF and both discontinuous use and problematic use, but not with general use, which may suggest the existence of the “SMF paradox.” Moreover, these effects were moderated by the age of the sample, assessment mode, and type of social media.

## Overall Association Between SMF and Social Media Use

The present study has identified a significant positive correlation between SMF and discontinuous use ( $r = .456$ ), indicating a relatively large effect size. This finding is consistent with the cognition-affect-conation (CAC) pattern, which suggests that emotional arousal plays a crucial role in the occurrence of behaviors, and negative emotions often co-occur with discontinuous behaviors (X. Yang, 2020). As a negative emotion experienced during social media use, SMF is often accompanied by low satisfaction with social media (S. Zhang et al., 2016). This low satisfaction may decrease users' behavioral intention to continue using social media, leading to passive use or even abandonment of social media (Venkatesh & Davis, 2000).

Secondly, there is a nonsignificant positive correlation between SMF and general use ( $r = .088$ ). This suggests that users with high SMF do not show significant signs of reduced (or increased) social media usage duration, frequency, and intensity. The weak positive correlation between the two is similar to meta-analyses on social media use and depression (Cunningham et al., 2021) and Internet use and psychological well-being (C. Huang, 2010). This may be because the indicators of general use (i.e., duration, frequency, and intensity) can only reflect individuals' overall usage patterns, which may obscure other features, such as types of activities and ways of use, leading to weak correlations when considering its relationship with other psychological variables (C. C. Yang et al., 2021). Additionally, this finding may also be related to participants' inability to accurately estimate their own social media usage time in daily life (Parry et al., 2021).

Finally, a significant positive correlation was also found between SMF and problematic use ( $r = .434$ ). This finding is comparable to effect sizes reported in previous meta-analyses on the relationship between problematic social media use and internalizing problems (C. Huang, 2022). The results also echo the extended stress-strain-outcome model proposed by Yu et al. (2018), which suggests that users with problematic use have a high dependence and inability to detach from social media. In the context of constantly updating internet information and expanding online social circles, individuals invest more internal resources to manage these social pressures, leading to SMF (Dhir et al., 2018).

## SMF Paradox? An Explanation Based on the Three-Dimensional Perspective of Social Media Use

As previously stated in the introduction, the majority of studies have focused on investigating the antecedents and consequences of SMF within the SSO framework. This framework suggests that problematic use serves as a stressor for SMF, and discontinuous

**Table 2***The Overall Association Between Social Media Use and SMF*

| Social media use  | $K_{\text{study}}$ | $K_{\text{effect size}}$ | $N$    | $r$ [95% CI]       | $Z$       | $Q_E$        | Level 2 variances ( $I^2$ ) | Level 3 variance ( $I^2$ ) |
|-------------------|--------------------|--------------------------|--------|--------------------|-----------|--------------|-----------------------------|----------------------------|
| Discontinuous use | 96                 | 152                      | 38,309 | .456 [.417, .492]  | 20.346*** | 3,379.471*** | .019*** (31.64%)            | .039*** (64.10%)           |
| General use       | 26                 | 30                       | 12,394 | .088 [−.019, .193] | 1.620     | 1,389.693*** | <.001 (0.51%)               | .074*** (96.50%)           |
| Problematic use   | 20                 | 31                       | 12,823 | .434 [.357, .505]  | 10.021*** | 775.760***   | .008 (18.77%)               | .035* (76.83%)             |

Note.  $K$  = number of studies;  $K_{\text{effect size}}$  = number of effect sizes;  $N$  = sample size;  $Q_E$  = results of heterogeneity test; Level 2 variances = variances within studies; Level 3 variances = variances between studies; SMF = social media fatigue.

\* $p < .05$ . \*\*\* $p < .001$ .

use is the outcome of SMF. These findings are theoretically plausible within the SSO framework. However, the SSO framework has a distinct time-series characteristic. Specifically, strain is experienced before stress, and outcomes appear after the response to strain. Nevertheless, existing pertinent studies, including this meta-analysis, are cross-sectional, indicating that at the same time point, SMF is highly positively correlated with problematic use and discontinuous use, demonstrating a concurrent relationship. These findings suggest the existence of the SMF paradox, which is similar to the privacy paradox, where there is a contradiction between people's need for privacy and their willingness to share personal information on social media in the digital age (Norberg et al., 2007). Furthermore, these findings indicate that problematic use, general use, and discontinuous use may not be on a continuum of the same variable. This helps to clarify the phenomenon of the "SMF paradox."

On one hand, discontinuous use may indicate passive browsing behavior without user-generated content in social media usage (Burke et al., 2010). This includes behaviors such as ignoring, quitting, lurking, avoiding, information blocking, and resistance (L. Liu et al., 2018). On the other hand, problematic use and general use may have distinct characteristics, and high-intensity general use does not necessarily equate to

problematic use. Problematic use refers to the level of adaptability in usage behavior, indicating a high degree of maladaptation in social media usage (Koc & Gulyagci, 2013). Du et al. (2018) also suggested that daily social media use and problematic social media use are two different concepts, and high-intensity habitual use does not necessarily indicate maladaptive characteristics in an individual's social media usage. In summary, we speculate that fatigued users, despite holding negative attitudes toward social media and intending to discontinue use, may not significantly reduce their use time due to maladaptive use characteristics. Instead, they may turn to passive use patterns.

## Major Moderators

The results of all three moderators' tests indicated that the relationship between SMF and social media use was moderated by age. Specifically, adolescents and college students have developmental needs that can be fulfilled through social media use (Ehrenreich et al., 2021; C. C. Yang et al., 2021). Furthermore, empirical data indicates that adolescents and emerging adults utilize social media platforms at a higher frequency and for longer durations than established social groups such as workers (C. C. Yang et al., 2021). Consequently, it is more probable that SMF and social media use are correlated among younger individuals.

Additionally, the analysis of general use suggests that the assessment mode and type of social media may also moderate the effect

**Table 3***Moderators of the SMF in Relation to Discontinuous Use*

| Moderator              | $B$   | LB    | UB   | $p$  |
|------------------------|-------|-------|------|------|
| Written language       |       |       |      |      |
| Chinese (ref.)         |       |       |      |      |
| English                | .039  | −.055 | .134 | .413 |
| Age                    | −.139 | −.292 | .014 | .076 |
| Men ratio              | −.016 | −.067 | .035 | .544 |
| Individualism index    | −.013 | −.057 | .031 | .565 |
| Publication year       | −.004 | −.051 | .043 | .856 |
| Methodological quality | .033  | −.014 | .080 | .168 |
| Assessment mode        |       |       |      |      |
| Paper-pencil (ref.)    |       |       |      |      |
| Online                 | −.004 | −.224 | .217 | .975 |
| Mixed                  | −.084 | −.351 | .183 | .536 |
| Measures of use        |       |       |      |      |
| Intention (ref.)       |       |       |      |      |
| Behavior               | −.038 | −.128 | .052 | .409 |
| Mixed                  | −.003 | −.125 | .120 | .967 |
| Type of social media   |       |       |      |      |
| Strong-ties (ref.)     |       |       |      |      |
| Weak-ties              | .009  | −.122 | .139 | .894 |
| General/Mixed          | −.048 | −.153 | .057 | .366 |

Note. For categorical variables, (ref.) denotes the reference category. "mixed" refers to an effect size that combines multiple categories under one moderator (for example, in the measures of use, an effect size combines intention and behavior).  $B$  = parameter estimate from mixed-effects meta-regression; SMF = social media fatigue; LB = lower bound of 95% CI; UB = upper bound of 95% CI; CI = confidence interval.

**Table 4***Moderators of the SMF in Relation to General Use*

| Moderator                   | $B$   | LB    | UB    | $p$  |
|-----------------------------|-------|-------|-------|------|
| Written language            |       |       |       |      |
| Chinese (ref.)              |       |       |       |      |
| English                     | .167  | −.048 | .383  | .128 |
| Age                         | −.176 | −.325 | −.027 | .021 |
| Men ratio                   | −.086 | −.278 | .105  | .376 |
| Individualism index         | .014  | −.090 | .117  | .794 |
| Publication year            | −.003 | −.105 | .098  | .952 |
| Methodological quality      | .004  | −.102 | .110  | .937 |
| Assessment mode             |       |       |       |      |
| Paper-pencil (ref.)         |       |       |       |      |
| Online                      | −.415 | −.812 | −.018 | .041 |
| Measures of use             |       |       |       |      |
| Objective indicators (ref.) |       |       |       |      |
| Subjective indicators       | .043  | −.171 | .256  | .696 |
| Type of social media        |       |       |       |      |
| Strong-ties (ref.)          |       |       |       |      |
| Weak-ties                   | .269  | −.070 | .607  | .120 |
| General/Mixed               | .291  | −.039 | .620  | .084 |

Note. "mixed" refers to an effect size that combines multiple categories under one moderator. SMF = social media fatigue; LB = lower bound of 95% CI; UB = upper bound of 95% CI; CI = confidence interval.

**Table 5**  
*Moderators of the SMF in Relation to Problematic Use*

| Moderator              | <i>B</i> | LB    | UB   | <i>p</i> |
|------------------------|----------|-------|------|----------|
| Written language       |          |       |      |          |
| Chinese (ref.)         | —        | —     | —    | —        |
| English                | —        | —     | —    | —        |
| Age                    | -.094    | -.199 | .011 | .081     |
| Men ratio              | .018     | -.082 | .118 | .725     |
| Individualism index    | -.006    | -.095 | .082 | .889     |
| Publication year       | -.020    | -.116 | .076 | .681     |
| Methodological quality | .036     | -.057 | .128 | .451     |
| Assessment mode        |          |       |      |          |
| Paper-pencil (ref.)    |          |       |      |          |
| Online                 | .007     | -.205 | .218 | .950     |
| Measures of use        |          |       |      |          |
| Excessive use (ref.)   |          |       |      |          |
| Addictive use          | -.012    | -.184 | .160 | .889     |
| Type of social media   |          |       |      |          |
| Strong-ties (ref.)     |          |       |      |          |
| Weak-ties              | -.036    | -.217 | .146 | .699     |
| General/Mixed          | .057     | -.130 | .243 | .552     |

*Note.* There is no article in Chinese, so we cannot analyze the moderating effect of written language. "mixed" refers to an effect size that combines multiple categories under one moderator. SMF = social media fatigue; LB = lower bound of 95% CI; UB = upper bound of 95% CI; CI = confidence interval.

size. Regarding the former, self-report bias in certain indicators of general use (e.g., frequency, duration) may be significant (Parry et al., 2021), which could be exacerbated by the lack of administrators in web-based tests, leading to smaller effect sizes in online assessments. In the latter case, weak-ties and general social media had significantly larger effect sizes than strong-ties social media. This could be attributed, in part, to the fact that images convey more information than words, resulting in cognitive overload and greater fatigue. Moreover, weak-ties social media platforms (e.g., Instagram) are more conducive to expressing positive personal emotions and self-promotion than their counterparts (e.g., Facebook; Waterloo et al., 2018). A recent meta-analysis revealed that Instagram users are more prone to experiencing fear of missing out when using social media than Facebook users (Y. Zhang, Li, & Yu, 2021). Consequently, Instagram users are more likely to exhibit a connection between general use and SMF. However, the number of effect sizes from paper-pencil assessment (four) and weak-ties social media (three) is limited, and therefore, the corresponding results should be interpreted with caution.

### Strengths, Limitations, and Future Directions

The strengths of this study are significant. Firstly, we systematically explored the relationship between SMF and three types of social media use (discontinuous use, general use, and problematic use), clarifying the controversy of previous research and providing a nuanced understanding of social media use patterns among fatigued users. Secondly, in addition to searching English databases, we also searched Chinese databases, which yielded more effect sizes than similar meta-analyses, allowing for conclusions that are not limited to Western countries. Thirdly, this study utilized a more advanced method, the three-level meta-analytic model, to analyze the data, which improved the precision of our results. Finally, this work attempted to heuristically explain the "SMF paradox" from a three-dimensional perspective of social media use, enriching related theories of SMF.

Although the current study has significant strengths, it also has some limitations. Specifically, the studies included in this meta-analysis are cross-sectional, which precludes causal inferences, as is the case with most prior empirical studies. Consequently, this study can only infer the patterns of social media use that accompany SMF, but not the changes in social media use that result from SMF or vice versa. Given the limitations of prior literature, future researchers should focus on the following four directions.

Firstly, the vast majority of previous studies, as mentioned before, have explored the antecedents and consequences of SMF within the SSO model. However, these studies have been primarily cross-sectional in nature, despite the time-series features of the SSO model. This approach has resulted in simultaneous measurement of variables such as stressor, strain, and outcome, which may not have changed concurrently. Conducting cross-sectional research under the SSO model can lead to conflicts between variables and make participants feel contradictory when filling out questionnaires, such as those related to discontinuous use and problematic use. Therefore, a longitudinal study is highly promising in breaking through the limitations of existing literature.

Secondly, social media use is a ubiquitous activity that individuals engage in regularly, and often compulsively, in their daily lives. As a psychological experience characterized by emotional fatigue and numbness, SMF is a dynamic process that can change within a short observation window. Furthermore, this process may be influenced by an individual's media susceptibility (Valkenburg et al., 2016). Given these considerations, it is informative to explore the relationship between social media use and SMF using an experience sampling method that offers higher ecological validity. The method enables investigation of the relationship between variables from the perspective of within-person variability and captures the dynamic processes of the variables of interest within a short time frame (Trull & Ebner-Priemer, 2014).

Thirdly, a recent study has revealed that self-reported media use frequency or time may differ significantly from actual intensity (Parry et al., 2021). Smartphone software has been developed that can provide accurate, highly detailed, and customizable information about smartphone use without compromising participant privacy (Geyer et al., 2022). Therefore, future research would benefit from real-time monitoring of social media data to examine the relationship between the exact intensity of users' social media use and SMF.

Finally, previous studies investigating the association between SMF and social media use lacked a theoretical system for measuring social media use. Simply considering the duration of Internet or social media use hardly reveals the mechanism of media effects and obscures the complex psychological processes (Odgers & Jensen, 2020). To address this, we propose a three-dimensional perspective of social media use, clarify the association between social media use and SMF, and interpret the "SMF paradox." Additionally, future research could comprehensively measure the ambiguous variable "social media use" by including dimensions such as specific activity and the communication partner (C. C. Yang et al., 2021).

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